ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 27.] MARCH. [1889.

LXXXIV.—FIBRE INDUSTRY AT THE BAHAMAS.

At the request of the Secretary of State for the Colonies, the following correspondence is published in the *Kew Bulletin*, respecting a fibre industry at the Bahamas, in which the Governor, Sir Ambrose Shea, takes a deep personal interest. A supplementary note is added, giving the most recent information which has reached Kew respecting fibres from *Agave* and other plants:—

COLONIAL OFFICE to ROYAL GARDENS, KEW.

Downing Street,
24th December 1888.

SIR,

I AM directed by Lord Knutsford to transmit to you a copy of a despatch from the Governor of the Bahamas, enclosing copies of a circular which he has addressed to the Resident and Assistant-Resident Justices of the Islands, on the present position and prospects of a fibre industry in the Colony, and to state that his Lordship would be glad if a copy of the circular could be inserted in the *Kew Bulletin*.

I am, &c.
(Signed) JOHN BRAMSTON.

The Director,
Royal Gardens, Kew.

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1889.

Price Twopence.

Sir A. Shea to Lord Knutsford.

Government House, Nassau, N.P.,
My Lord, 22nd November 1888.

I have the honour to transmit to your Lordship six printed copies of a circular which I have caused to be addressed to the Resident and Assistant-Resident Justices of the Bahama Islands on the subject of the present position and prospects of a fibre industry which is gradually being adopted by the people with a growing faith in its important bearing on their future welfare.

I am, however, anxious that the attention of capitalists should be directed to the solid attractions of this production, and I know of no investment so free from the speculative element and offering a fairer promise of remunerative results.

With a population so long in a stagnant and somewhat contented state, I feel some outside influence is required to urge this industry into vigorous activity, and your Lordship will confer a great good by enlisting the attention of some leading journal to the information in my letter, and thus attract those whose enterprise it would be so important to have engaged in developing this industry, and whose operations would be exemplary to the native population.

I have, &c.
(Signed) A. Shea,
Governor.

The Right Hon. Lord Knutsford,
&c. &c. &c.

[Circular.]

Colonial Secretary's Office, Nassau, N.P.,
Sir, 22nd November 1888.

I am directed by his Excellency the Governor to call your attention to the important question of fibre cultivation, now so largely engaging the minds of the public, and on which it is essential that the fullest information should be disseminated.

During his Excellency's late absence from the Colony, he was enabled to gather some instructive particulars, which strengthens his faith in the part the fibre industry is to play in the speedy advancement of the Colony.

Through the good offices of the Crown Agents for the Colonies in London, the following statement was obtained from Mr. Thomas Briggs, a gentleman of great authority, to whom a sample of rough rope from Bahamas fibre was submitted for examination. Mr. Briggs states, under date September 3rd, 1888:—"This material I consider equal to very "good Manilla hemp, and worth in the unspun, raw state thirty-six to "thirty-eight pounds per ton, colour excepted, which is not of very great "importance. I consider it to be a very superior article for spinning "in yarns for rope-making, and unless in bulk some ingredient should "be found to counteract its apparent good qualities, it should find a "ready sale at the price I name."

This testimony is highly satisfactory, and in the United States the article is not less fully estimated. It is, moreover, a staple commodity of commerce in which serious variations of value are not to be looked for, and this goes to rid the work of production of uncertain and risky conditions.

With land and climate so adapted for the growth of the Sisal fibre, the plant being indigenous, it is remarkable that the industry had not acquired a practical existence until the Legislature gave it an impetus

by the fostering Act of the Session of February last—so little was it generally regarded that the small farmers viewed the plant with despair as a noxious weed they were unable to eradicate. From every part of the Colony we now have gratifying proofs of an awakening and intelligent spirit and of the steady advance in the establishment of the industry, and public faith in its efficiency as an agent of general future prosperity increases as we proceed in the work of inquiry. There are some very interesting statements in a pamphlet recently published by Mr. Stoddart, of Jamaica, who spent some time in Yucatan, where the fibre industry has for some years been prosecuted with conspicuous success, under conditions of soil and climate not more favourable than we have in these Islands. We were aware that the plant is independent of drought, and this is Mr. Stoddart's experience. It was also believed in this Colony that it takes about three years after planting to bring the leaf to a productive state, and this is confirmed by Mr. Stoddart, who also affirms that it will then yield annually for 15 to 20 years without any material outlay on its cultivation. The produce of an acre in full growth Mr. Stoddart sets down at from one thousand to twelve hundred pounds of fibre, and he corroborates the opinion held here that the plant thrives best on rocky and impoverished soil, and that it is shunned by cattle, and consequently free from injury on this account.

Mr. Stoddart's estimate of production, which it is not meant to impeach, admits of a large abatement and yet leaves the enterprise full of promise. At a fair price he makes the money value of an acre about eighty dollars annually, but His Excellency prefers a lower basis of calculation to cover all assumable adverse contingencies. The Governor in this view takes fifty dollars an acre annually, which gives a handsome margin of profit on the cultivation. The return of wheat farming is highly enough placed at 35 bushels an acre, or as many dollars at a reasonable computation of price, and we are thus brought in presence of the extraordinary conclusion that the barren lands of the Bahamas, through the fibre cultivation, are made to bear an economic value beyond the favoured wheat-growing regions of the United States and Canada. We moreover find this difference enhanced by the fact that the fibre needs but one planting for 15 to 20 crops, while wheat must be planted annually, and is liable to many injurious contingencies from which the Sisal plant is exempt.

These islands should be the Paradise of the working man. The land is obtainable on very easy terms, and in lots to meet the circumstances of the labouring population. To create the largest possible number of peasant proprietors is the great desire of the Government. But it is not their intention to lead the people away from their present pursuits, for the new industry can be combined with those existing, as it will involve little more than the use of the time now left on their hands. There are nearly 2,000,000 acres of ungranted lands in the Colony, and with the conditions of purchase, the facilities for prosecuting the fibre cultivation and its value as a staple article of commerce, the countries are few that offer so fair a field for the reward of the capital and labour that may seek investment in this undertaking.

It is intended immediately to despatch a Commissioner from this Government to Yucatan to make further inquiries, as it is of the utmost importance to have the fullest information on the whole economy of the industry, in which the people of this Colony are now so vitally interested.

I am, &c.
(Signed) E. B. A. Taylor,
Colonial Secretary.

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[It is desirable to add a few words to supplement the information given in the interesting circular issued by the Government of the Bahamas.

This information is very similar (with the exception of one or two points to be mentioned later) to that already published in the *Kew Bulletin* for March 1887, pp. 3–8.

Mr. Stoddart's report (published by the Government of Jamaica) on which the estimates of profit in Mr. Taylor's memorandum are based, was communicated by Kew to the Colonial Office for transmission to the Goverment of the Bahamas in reply to a despatch from Governor (Sir Henry) Blake, dated 24th January 1887.

It was pointed out at the time in par. 5 of the Kew letter, dated 15th February 1887, that "the statements contained in the pamphlet are not "necessarily endorsed, either by the Government of Jamiaca or by "Kew. It professes to be nothing more than an account given by a "Jamaican resident of the fibre industry in Yucatan in which he was "practically engaged for some time."

It is to the credit of Mr. Stoddart, however, that his account of the fibre industry of Yucatan is confirmed in most particulars by other writers, and there is no reason to believe that it requires correction in any essential part. It may at the same time be desirable to point out some of the conditions under which the industry is remunerative in Yucatan.

For instance the rates of wages in Yucatan are comparatively low (ranging from 9*d.* to 1*s.* per day for labourers), and under such circumstances, Mr. Stoddart estimates (at page 10) the net profit on current expenses at "between 4*l.* and 5*l.* per acre" (equal to between 20 and 30 dollars per acre). The plants, if 18 inches high when first put out, are said to be ready for a first cutting in three years. This period may, however, under unfavourable circumstances, be prolonged to five or six years. Another important point to bear in mind is that Mr. Stoddart speaks only of returns obtained by the use of machines driven by steam-power, and by working plantations of say 100 acres or more. The methods suited to one country are not necessarily suited to another. Possibly at the Bahamas it might be advantageous for small cultivators to clean the fibre in their leisure hours by hand, and sell it locally to merchants who would ultimately undertake the business of baling and shipping it. If the fibre is not properly baled, the cost of freight would be so large as to greatly reduce the returns. Indeed the fibre in a loose state is so bulky that it would be almost impossible to ship it at such a rate as would enable it to compete successfully with fibres from other countries. It is usual to pack this class of fibre by means of hydraulic presses, in bales of about 400 pounds each. If the small proprietors in the Bahamas take up a fibre industry, it is evident that some one possessing capital should be prepared to purchase the fibre in small quantities and pack it by means of suitable presses ready for shipment. There are no grounds, however, for supposing that a fibre industry based on *Agave* and *Furcræa* plants, and judiciously pursued, can be otherwise than satisfactory.

A collection of fibre plants was received at Kew about two years ago from the Government of Bahamas, and it was stated in a letter dated the 16th May 1887, that among these specimens there is no species exactly answering to that yielding the Sisal Hemp of commerce. The fibres of No. 2 (*Furcræa cubensis*), and No. 3 (*Furcræa cubensis*, var. *inermis*), are the most valuable, and these are used partly as a source of commercial fibres in Yucatan. The true Sisal Hemp plant is *Agave rigida*. This may be abundant in the Bahamas, but no specimens were

received of it. Other fibre plants received at the time mentioned were *Agave lurida* and *Agave americana* var. *variegata*, the latter a variegated form of the common American Agave. These latter are of little value for fibre as compared with the true Sisal hemp plant. Specimens of African bow-string hemp (*Sansevieria guiniensis*) were also received, the fibre of which is of high value.

A fibre industry has been in existence in Mauritius for some years. The experience gained there might be of service in the Bahamas, especially in regard to the initial difficulties to be overcome in establishing a new industry.

The market value of this class of fibre, and the permanency of demand for it, has been fully investigated at Kew, and in a note on p. 3 of the *Kew Bulletin* for April 1887, there is a summary furnished by Messrs. Ide and Christie, which gives the average price per ton for Sisal hemp in London for the years 1879–86 inclusive. These are 1879, 27*l.*; 1880, 27*l.*; 1881, 28*l.*; 1882, 28*l.*; 1883, 27*l.*; 1884, 21*l.*; 1885, 19*l.*; 1886, 21*l.* The highest price paid was 32*l.* 10*s.* 0*d.* in December 1879 to February 1880, the lowest price was 17*l.* 15*s.* 0*d.* in January and February 1886. Recently there has been an increased demand for white fibres, with a corresponding rise in prices. There were no quotations for Sisal hemp in Messrs. Ide and Christie's London Monthly Circular for December 15th, 1888. The only remark being "in retail supply, and selling at fancy prices." In the United States, Messrs. Crocker's Statistics, dated the 1st December, gave the price at 8 to 8$\frac{3}{8}$ cents. per lb. (equal to about 37*l.* to 39*l.* per ton). A rough Agave fibre from Bombay (probably prepared by hand) was valued last December at 15*l.* to 17*l.* per ton. Mauritius hemp prepared by machinery from *Furcræa gigantea* (known as the green aloe or green Agave) was valued: good, 34*l.* to 35*l.* per ton; fair, 33*l.* per ton; common, 30*l.* per ton. D. M.]

LXXXV.—HARDY SPECIES OF EUCALYPTUS.

It is well known that some species of Eucalyptus are hardy in certain districts in this country, but the ordinary Blue Gum, *E. Globulus* is only sparingly so. We have recently received from Mr. F. Abbott, Superintendent of the Botanic Gardens at Hobart Town, Tasmania, a small quantity of seed of this species collected from trees growing at high altitudes and exposed to severe frosts. Seeds were also received of *E. coccifera* from trees which were coated with icicles "a foot long." It is probably that plants raised from seed of such hardy forms would be likely to bear with impunity the rigours of an English winter. The seed received has all been sown and the results will be duly noted later. In the meantime the following extract from a letter received from Mr. Abbott will be read with interest:—

In the same package I put a little seed of *Eucalyptus Globulus* from Tullochgorum, a part of the Colony where the winters are severe, and on that account the plants raised from the seed forwarded are likely to withstand an amount of cold that would kill the ordinary form, at all events it is so here, as all attempts to introduce the plants into the district from the southern parts of the island failed, the cold proving too severe. Eventually a few isolated plants of *E. Globulus* were found growing in a sheltered gully some 20 miles from Tullochgorum. These were the only plants of the species that have been found growing naturally in so cold a climate, and plants raised from these trees were planted about Tullochgorum, and grew into large trees, without ever

suffering from the severe frosts so prevalent in the district which has always killed plants brought from the warmer parts of the island. It would therefore be well worth while to give any seedlings you may raise from the seed sent a fair trial, with a view of proving whether this particular variety is sufficiently hardy to withstand the cold of an English winter. It will not be possible to obtain much seed, but any I may get I will forward to you, as you will have a better opportunity of testing it. I have a little more drying out which will be forwarded as soon as it is ready. I send with this a little seed of the hardy *E. coccifera* which I have seen on the top of Mount Wellington completely coated with ice, and shielded with icicles a foot or more long hanging from the branches. I have no seed of *E. verrucosa* at present, but will get some as soon as possible. This is a very dwarf species, usually under 4 feet, and at best is very sparing at producing seed. I have no doubt it will be hardy.

LXXXVI.—YAM BEAN.

(*Pachyrhizus tuberosus*, Spreng.)

With Plate.

In the *Kew Bulletin* for January last, p. 17, an account was given of the interesting economic plant known as Yam Bean (*Pachyrhizus tuberosus*, Spreng). It was then mentioned that a figure and description of the species was in course of preparation for the *Icones Plantarum;* and by permission of the Bentham Trustees this figure is now reproduced in the *Kew Bulletin*. The only previous figures of this plant appear in Plumier, *Plant. Amer.*, pl. 220, and in Descourtilz, *Flore des Antilles* (1829), viii., p. 127, pl. 554. As these old works are not readily accessible, the present figure will prove of interest and afford a means of comparison with *P. angulatus*, Rich., a figure of which will appear later.

Pachyrhizus tuberosus, Spreng. Syst. Veg. IV., pars. 2, 281. Roots tuberous. Stem herbaceous twining 10–20 ft. (Spruce). Leaves pinnate, 3-foliolate, long-petioled, stipules linear lanceolate; leaflets broadly rhomboid-ovate pointed entire or obscurely sinuate, in young specimens sometimes shallowly lobed, terminal leaflet broadly cuneate at the base, lateral oblique, stipels subulate. Racemes sub-compound, lower branches very short, with flowers in fascicles. Calyx 5-lobed, lobes as long as the tube, superior shorter. Corolla white (Trimen). Legume 8–12 inches long, 9–10 lines broad, slightly hairy when young compressed somewhat bent, with deep transverse depressions between the red black or pale spotted seeds.

The specimens in the Kew Herbarium are all apparently from cultivated plants.—Tarapota, Spruce (4936), from Dr. Ernst, Caracas, and recently from Dr. Trimen, of the Botanic Garden, Peradeniya, Ceylon.

Professor Oliver states that "it may be a question how far this "plant is specifically distinct from *Pachyrhizus angulatus*, Rich. "Mr. Bentham regarded Spruce's specimens from Peru as belonging to "this species. I think it may well be a variety originated under cul- "tivation, but so marked as to require a distinct name for cultural "purposes, and for the present the specific name given by Lamarck "may suitably be adopted."

In a letter dated Caracas, 2nd February, Dr. Ernst supplies the following additional information :—

With respect to *Pachyrhizus tuberosus*, which I had in cultivation or some time, I must say that in our form the flowers are bluish violet, the

M.S. del, et lith.

Pachyrrhizus tuberosus, Spr.

pods about 15–20 cm. long and 15 mm. broad and the seeds dull black. I am very sorry I have no pods left. I sent all the ripe seeds I had to Professor Flückiger at Strassburg in order to have their toxic proprieties duly investigated ; but I have not received any information about the result from him, although he wrote me he had given the seeds to one of his assistants for the purpose indicated. I think I wrote you that the seeds (in decoction or in form of powder) are used in Merida (Venezuela) for killing vermin. You are quite right in saying that toxic properties have been noticed in several species of beans. Only a few days ago one of my former pupils wrote to me from the State of Táchira that he had seen a case of poisoning with a kind of bean called here *tapiramo* (a species of Dolichos). The cooks have a rule to throw away the first water in which these tapiramo have been boiled. It is certainly of a disagreeable taste. I should say that there is a substance like lupinin in the seed-coats.

You sent me once seeds of Pachyrhizus [probably *P. angulatus*] from an East Indian garden. The plants grew, but I was unfortunately not in Caracas when they flowered. I have been told by my man that the flower was reddish-white. I have a few pods of these plants which I send you to-day. They are much smaller than those of our indigenous species.

Fig. 1. Calyx and stamens. 2. Vexillum. 3 and 4. Carinal petal. 5. Pistil.—*Enlarged.*

LXXXVII.—WEST AFRICAN RUBBERS.

The information contained in the following correspondence and papers in respect to West African Rubbers may be usefully perused in continuation of that already published in a recent number of the *Kew Bulletin* (November 1888, p. 253) :—

FOREIGN OFFICE to ROYAL GARDENS, KEW.

SIR, Foreign Office, 17th June 1887.

I AM directed by the Marquis of Salisbury to transmit to you herewith certain samples of india-rubber which have been obtained from a district under British protection to the West of the Rio del Rey, by Mr. H. H. Johnston, British Vice-Consul at Old Calabar, during an exploration made by him of that region, and I am to desire you to submit the samples in question to an examination by some specialist in order that their quality and value may be tested, and to report the result to this Department.

I am, &c.,
(Signed) T. V. LISTER.

W. T. Thiselton Dyer, Esq., C.M.G., &c.
Royal Gardens, Kew.

MR. S. W. SILVER, F.L.S., to ROYAL GARDENS, KEW.

3, York Gate, Regent's Park, N.W.,
DEAR SIR, 27th July 1887.

REFERRING to mine of the 29th ultimo, I have the pleasure to forward a copy of the report from our chemist at Silvertown with samples showing the results, and to state that sample No. 2 has a

market value of 1*s.* per lb.; No. 3 (dark) 1*s.* 6*d.*, No. 3 (light) 1*s.* 10*d.* and 2*s.*; No. 5 about 2*s.* 3*d.*

I am, &c.

D. Morris, Esq., (Signed) S. W. Silver.
Royal Gardens, Kew.

Report of the India Rubber, Gutta Percha, and Telegraph Works Company, Limited.

Silvertown, 21st July 1887.

Description, &c.—Four samples of india-rubber were received, marked respectively No. 2, No. 3, No. 3 (dark), and No. 5.

The samples marked No. 3 have been dealt with as duplicate samples of the same rubber. Sample No. 2 was black and sticky on the outside due to oxidation, the freshly-cut surfaces were slate-grey colour. The rubber was firm and non-adhesive to the fingers. The samples marked No. 3 differed slightly in appearance, one was much darker than the other. The darker sample evidently would be more prone to decay than the lighter sample, but still both samples are remarkably good for African rubber. Both these samples consisted of agglomerated tear-like masses, with red and pinkish particles strongly resembling rubber. Evidently, if these samples are from the same plant, the difference in colour of the tears must be due to the incision or puncture extending to different tissues. The light-coloured particles were very similar to good Ceara rubber. The freshly-cut surfaces of sample No. 5 were whitish in colour. It was very similar to the better specimen of No. 3, and as a raw article is quite equal to the best kinds of Brazilian rubber. On so small a sample, it would be difficult to say how it would behave in general manufacture. The behaviour of a specimen under manipulation is of primary importance in fixing its commercial value. However, this specimen is far above the best kinds of African rubber.

In Manufacturing, &c.—No. 2 lost 14·5 per cent. on washing and drying, becoming sticky and of course difficult to treat in the ordinary way. In quality it is very low, being inferior to flake African. Mixed with a suitable proportion of sulphur it vulcanized fairly well and free from sponginess. It would hardly be suitable for working by itself, but with firmer kinds of rubber it would mix well and yield a product suitable for many low class manufactures. The two samples marked No. 3 lost 5·6 per cent. on washing and drying. The samples were mixed together and behaved very well in grinding and mixing. It vulcanizes very well in being elastic, firm, and solid. In this stage it takes a dark colour, but is not offensive in smell.

No. 5 sample gave a loss of 8 per cent. on washing and drying. It vulcanizes very well, although dark in colour. Its smell is not offensive but strong.

Remarks.—As a rule the African rubbers give dark products on vulcanizing, and many of them have an offensive odour, which arises no doubt from the action of sulphur, in vulcanizing, on some principle contained in the natural sap of the plant yielding the rubber.

Messrs. Taylor, Laughland and Company, of Glasgow, recently forwarded specimens of West African rubber with a letter of which the following is an extract:—

One of our agents in Old Calabar, West Africa, has collected and sent us a few samples which he is very anxious to get classified, and

thinking that you would help us in this, we have sent to-day to your address per Globe Parcel Express, carriage paid, a parcel containing these samples as per enclosed list. He is anxious to get the natives to cultivate the rubber vine and make rubber more freely. He says he has been up the country and finds the various kinds of rubber vines in great abundance, but no rubber is taken from them, as until quite recently the natives did not know that there was any value in it, and even now they do not know how to make the rubber from the juice. In order to teach them and secure the best plants, he has sent home specimens of the leaves of four common kinds of vines with the native names, and if you can give us the scientific names we shall feel much obliged. He sends also the rubber from them, but, as you will see, it is very badly made. Can you say which is the most valuable of these four vines?

Three of the four specimens sent were wholly inadequate for any determination. But one called Npok was identifiable as *Landolphia owariensis* which is found from Sierra Leone to Angola, and is no doubt the most important source of West African rubber. [*See* Kew Report for 1880, p. 38.]

An investigation into india-rubber milk received at Kew from the Niger delta is described in the following correspondence:—

38, Elthiron Road, Fulham, S.W.,
14th September 1888.

DEAR SIR,

SEVERAL gentlemen to whom I have applied for information about india-rubber have recommended me to communicate with you. I therefore venture to ask if you can help me, and trust you will pardon me for intruding on your valuable time. To explain myself fully, let me say that I have for some years been trading on the West Coast of Africa, in the oil rivers (the deltas of the Niger). For some time past we have been endeavouring to introduce and foster the india-rubber trade, and have been partially successful. There are quantities of rubber trees and vines, but the natives of these districts, having hitherto never cultivated the article, are quite ignorant of the mode of preparing the milk obtained from these trees and vines to convert it into a commercial form. We are quite certain that this matter will open a wide field of commerce to the benefit of the native, the trader, and the consumer, if we could learn the mode of treatment. What I wish to ask you is if you can inform me of the best mode of congealing the milk as it is obtained from the tree. Accompanying this I send you a small sample of rubber milk in its natural state. Should you deem it worthy of your notice, I will most gladly furnish you with a larger sample for experimental or other purposes.

I am, &c.
(Signed) JAMES S. COCKBURN.

W. T. Thiselton Dyer, Esq.,
Royal Gardens, Kew.

ROYAL GARDENS, KEW, to Mr. JAMES COCKBURN.

SIR,

Royal Gardens, Kew, 2nd November 1888.

I BEG to forward herewith a copy of a report received from S. W. Silver, Esq., F.L.S., on the sample of rubber milk from the Delta of the Niger which you recently forwarded to this establishment.

2. I regret to notice that this substance is not of a character likely to be of use in commerce, and the results of the experiments are such as

preclude any hope of solving the question of coagulating the milk in a satisfactory manner on this side.

3. If we had specimens of the leaves, flowers, and fruit of the tree from which the milk was obtained, we might then be in a position to suggest a treatment that would afford satisfactory results. At present we have no data upon which to work, and the matter cannot be carried any further.

4. We would suggest that steps be taken to procure specimens of leaves, flowers, and fruit of all rubber plants in the district in which you are interested, and we enclose instructions for collecting and preparing such specimens, so that they might arrive in this country in a suitable state for examination.

I am, &c.
(Signed) D. Morris.

J. Cockburn, Esq.

(Enclosure.)

Report of the India Rubber, Gutta Percha, and Telegraph Works Company, on Specimen of India-Rubber Milk from West Coast of Africa.

Silvertown, October 26, 1888.

The contents of the tin were strongly acid; on pouring out the same it was found that the tin contained a large quantity of already coagulated gum, which could only be removed by cutting off the lid. The part coagulated was treated by itself. The portion still liquid was emptied into open dishes, so as to cause a further separation of coagulum by evaporation. The portion which separated in this case was treated by itself. Both products were very sticky, and became more so as the washing process was continued; they ultimately became quite unmanageable for the subsequent stages of drying, &c.; the substance is quite unsuited for any ordinary india-rubber manufacture.

By destructive distillation it does not yield caoutchoucene, which is the principal characteristic of caouchouc or india-rubber. The distillate more closely resembles in smell that of some principles, balsams, &c. which yield cinnamic acid. This is highly characteristic and of value in determining the suitability of a lactescent juice as a mercantile source of caoutchouc. The most suitable way of obtaining the coagulum from this juice is by leaving the same exposed in open vessels, and collecting what forms on the surface from time to time so as to increase the chance of further evaporation, &c. If it be intended to send these natural juices for examination it will be best to add ammonia freely, so as to neutralise any acid which may be generated whilst in transit.

The Resident Manager adds: "We do not see our way to make use "of this material. We quite agree with your remarks to Mr. Morris "as to the chemical change in these juices that takes place before they "can arrive in this country."

LXXXVIII.—PHYLLOXERA IN ASIA MINOR.

The introduction of the Phylloxera into Asia Minor was reported to the Foreign Office by Acting Consul-General Barnham from Smyrna in June last.

The introduction of this terrible pest into this part of the world appears not to have been an accident, but the result of a deliberate

importation of vine plants from a country where the disease was known to exist. Persons engaged in horticultural business often complain bitterly, and sometimes with good cause, against the restrictions which the Phylloxera regulations impose upon them. But in the face of the facts detailed in the following correspondence it is difficult to find grounds for protesting against such regulations :—

Acting-Consul Barnham to Foreign Office.

My Lord, Smyrna, 4th June 1888.

I have the honour to confirm my telegram of the 2nd inst., by which I informed your Lordship that Phylloxera had attacked the vines in the neighbourhood of Smyrna.

The disease has been discovered in certain vineyards between Smyrna and Bondjah, and in others between the Bondjah road and the village of Koukloudja. The full extent of the evil is, however, probably greater.

Messrs. Müller and Suppa, of the German wine factory, who are considered the best authorities on the subject in Smyrna, report that the Phylloxera which has now appeared is that known as wingless insect with suckers, which is found embedded in the lower roots of the vine, presenting to the naked eye the appearance of small yellow specks, but fully revealed by the aid of ordinary magnifying glass. In all its details it corresponds with the form of Phylloxera which is found at this season of the year.

The advanced appearance of the disease, and the evidence given by the villagers upon the subject, have led these specialists to conclude that Phylloxera has already existed in the neighbourhood for two years.

The appearance of Phylloxera is justly regarded as a great calamity in this district. It will inflict ruin upon hundreds of families which have no other means of support than the produce of their vineyards, and inflict a terrible blow upon a branch of export which was estimated in 1886 as high as 1,540,340*l.**

The only remedy which suggests itself is that the vineyards affected should be destroyed, and that the authorities should permit the introduction of American plants, which, being tougher, are better calculated to resist.

A Government Commission has been appointed to investigate the matter, and I will report as soon as possible.

I have, &c.

(Signed) H. D. Barnham,

Acting Consul-General.

The Marquis of Salisbury, K.G.,
&c. &c. &c.

Acting-Consul Barnham to Sir W. A. White.

H.M. Consulate, Smyrna,

Sir, 21st June 1888.

With reference to my despatch No. 31, of the 4th instant, I have the honour to report that the local authorities are endeavouring to prevent the spread of Phylloxera by the total destruction of the affected vineyards. No official report has yet appeared upon the labours of the Commission, but the following information is authentic. It has been decided that the vine-growers whose property is doomed shall receive

* ? Piastres 1,540,340 = £140,300.

ten Turkish pounds per dunum as compensation, and that as there are no municipal funds from which this money could be drawn, a tax of one piastre shall be levied on every hundredweight of raisins offered for sale in Smyrna and the neighbouring ports, or in other words, an increased tithe to that extent.

It appears certain that the Phylloxera has existed here for at least three years, and the Commission have obtained evidence that it was introduced by the German vine-growers, Messrs. Müller and Suppa. Three or four years ago these gentlemen are said to have introduced a German vine, highly prized by connoisseurs, but which contained Phylloxera.

Certain of the villagers declare that on the introduction of these plants they stole some of them and replanted them in their own grounds, and wherever they were transplanted the disease has appeared.

Should the local authorities apply to me for permission to examine the vines of British subjects, I will, subject to your Excellency's approval, give that permission whenever the authorities can give *primâ facie* evidence that the presence of Phylloxera is probable, and of course, if affected, the vines of British subjects must be treated as those of other subjects.

I have, &c.
(Signed) H. D. Barnham.
Acting-Consul General.

The Right Hon. Sir W. A. White, G.C.B.,
&c. &c. &c.

Sir W. A. White to Foreign Office.

Constantinople,
My Lord, 9th February 1889.

I have the honour to enclose herewith copy of the article which appeared in the "Levant Herald" respecting certain measures of precaution adopted by the Turkish Government against Phylloxera, of which mention was made in your Lordship's despatch No. 7, Commercial, of the 17th ultimo.

From inquiries that I made at the Ministry of Commerce with a view to ascertaining what measures the Imperial Government had taken against Phylloxera, I learnt that the Ministry had endeavoured to treat the diseased vines in the neighbourhood of Srenkein (near Constantinople) with bi-sulphide of carbon, the means usually employed in France and Algeria, but that owing to special and independent causes, these measures had not been carried out in their entirety; secondly, that the same means had proved most successful at Smyrna and the neighbourhood, where Nouri Bey, Director of Agriculture, had himself superintended the operations; and thirdly, that vines in the district of Smyrna, being mostly planted on land capable of submersion, the Ministry of Commerce had made a proposal to the Porte, that vine owners who should consent to their vines being submerged annually for 40 days, should be exempted from taxes for a certain period, and in general should receive all possible encouragement.

Nurseries of vine-plants procured from America, from which healthy cuttings can be obtained by cultivators, have already been established in districts where the vines have been affected by Phylloxera.

I have, &c
(Signed) W. A. White.

The Marquis of Salisbury, K.G.,
&c. &c. &c.

LXXXIX.—BOTANICAL STATION AT LAGOS.

In the *Kew Bulletin* for June 1888, p. 149, an account was given of the establishment of a Botanical Station at Lagos, West Africa. This is the first effort of the kind made in that part of the world, and it is very gratifying to find that under the control of the Governor, His Excellency Captain Moloney, C.M.G., the result attained is most creditable to all concerned. The following official correspondence respecting this Station has lately been received at Kew:—

COLONIAL OFFICE to ROYAL GARDENS, KEW.

Downing Street,
20th December 1888.

SIR,

I AM directed by the Secretary of State for the Colonies to transmit to you for any observations you may have to make, a copy of a despatch from the Governor of Lagos, forwarding a report on the Botanic Station for the quarter ended 30th September 1888.

I am, &c.
(Signed) ROBERT G. W. HERBERT.

The Director,
Royal Gardens, Kew.

Governor MOLONEY to LORD KNUTSFORD.

Government House, Lagos,
12th November 1888.

MY LORD,

IN continuation of my despatch No. 273, of the 3rd ultimo, I have the honour to transmit copies, as per margin of the fourth report, on the Botanic Station of the Colony of Lagos for the quarter ended 30th September 1888.

Your Lordship will observe that the reasons advanced at the end of 1886, in favour of the establishment as a branch of this Government of a Botanic centre in this Colony have been within a year supported by the attainment of the objects on account of which the institution was advocated.

The Superintendent's enthusiastic interest and good work have been as noticeable as in previous quarters, and satisfactory progress continues to be made.

Since May last there have been issued from the Botanic centre 9,326 plants, of which 7,096 were coffee.

Under sale of plants the treasurer has received as revenue to the close of October, the sum of £20 7*s.* 1½*d.*

At the end of September the cocoa-nut seed planting of the Government reached 31,483. It is intended to establish permanently in the Eastern and Western Districts, at the beginning of the next rainy season, plantations to the extent of 30,000 trees, the fruit of which in time should be worth £6,000 per annum to the Government; further, to continue, in the future, the nursery work to keep a supply of seedlings on hand to replace failures, and for distribution among the people, in exchange for seed nuts, or by purchase at the low rate of 1*d.* each.

It will be not without interest to mention here that the Government has recently received an order for 1,000 seedlings for a cocoa-nut plantation, contemplated at the south-east end of the island of Lagos.

In favour of the further extension to West Africa of the Botanic Station scheme, this Government will be prepared to educate and train up, for the bare return, cost of maintenance, and clothing in each case,

apprentices as sub-gardeners from any of he sister Colonies, whether for Governmental or private enterprise.

I have, &c.

(Signed) ALFRED MOLONEY,
Governor.

The Right Hon. Lord Knutsford,
&c. &c. &c.

EXTRACT from REPORT on the BOTANIC STATION, LAGOS, for Quarter ended 30th September 1888.

For the period under review the Superintendent has paid special attention to nursery work in general, such as propagating plants by seed and cuttings, potting, preparation of seed beds, &c. The service of putting plants in their permanent places has also proceeded, as well as that of laying out new walks, of forming grass borders, &c. Fifty-five plants have been put in their permanent places, viz., 30 ornamental, one fruit, four roses, and 20 economic.

The cacao plants and Liberian coffees have thriven well under the shade of West Indian castor-oil plants and banana trees. The arnotto plants in permanent places continue to look healthy; several shrubs have borne fruit, and the Superintendent will be able shortly to propagate therefrom a large quantity of plants. An important part of the original scheme for this station has been carried out by the establishment of a model kitchen garden in the north-west corner of the garden. Twenty large beds have been laid out and planted. A contractor has been found to take for one quarter the vegetables in excess of the requirements of the Superintendent, at a nominal rate of 2*l.* per month; they are exposed by the contractor for sale, every morning, on a moveable stall, erected for the purpose by the Government at the meat market. Later it is intended by the Government to call for tenders for the service of sale of the produce. The issue of plants from the garden for this quarter reach a total of 4,569; of this number 3,770 were purchased, and payment to the sum of 7*l.* 17*s.* 1*d.* made accordingly into the Treasury; the balance represented free issues.

In accordance with a desire conveyed to introduce the best sorts of pine apples for cultivation at Lagos, the Director of the Royal Gardens, Kew, has been good enough to obtain, with some trouble, suckers from the Mentmore Gardens, England. The following were the varieties locally received on the 15th July last:—three "Queen"; three "Lord Carrington"; three "Charlotte Rothschild"; three "Smooth Cayenne."

With reference to cocoa-nut planting industry that proceeds in the hands of the Government, the following represents the seed planting in the districts for the quarter:—Leckie, Eastern District, 1,185; Palma, Eastern District, 600; Badagry, Western District, 7,409; total 9,194.

The plantations to the extent of 30,000, as contemplated to be laid out early next year in the eastern and western districts, should, when generally bearing, be worth to the Government 6,000*l.* per annum. Further, it is intended to continue in the future the cocoa-nut nursery work of the districts, and keep a supply of seedlings on hand to replace failures, and for distribution among people in exchange for seed nuts or by purchase at the low rate of 1*d.* each.

The stage of development at which the garden has arrived can be gauged from the list embodied in this report of plants at the Botanic Station, on the 30th September 1888. To promote a wider distribution of plants, and to extend the means of industrial education afforded by the station, it is hoped by the Government that in time branches of the nursery department may be established at Badagry and Leckie, with a

trained sub-gardener in charge of each, under the control and direction of the respective Commissioners.

The exports from the Colony during the quarter of palm kernels, palm oil, cotton, beniseed, coprah, gum and rubber were as follows:—Palm kernels, 13,226 tons; cotton, 46 tons; beniseed, 4½ tons; coprah, 1¾ cwt.; ogea gum, 9 tons; rubber, 1¼ cwt.; palm oil, 287,371 gallons.

For instruction, in accordance with the original scheme, there was introduced on the 14th September, into the garden, one Gbami, the nephew of Chief Manuah of Itebu.

In favour of the further extension to West Africa of the Botanic Station scheme, this Government will be prepared to educate and train, for the bare return of the cost of maintenance and clothing in each case, apprentices as sub-gardeners from any of the sister Colonies whether for Governmental or private enterprise. The Governor and his staff have made several visits to the garden during the quarter. The other visitors to the garden numbered 69 persons, of whom 30 were white and 39 black; besides Government officials, they were chiefly made up of ladies, clergymen, and other professional gentlemen, merchants, traders, &c.

XC.—CHIGA BREAD.

(*Campsiandra comosa*, Benth.)

An interesting inquiry has been carried on by Dr. Ernst of Caracas, respecting the plant yielding Chiga flour or Chiga starch used in the tropical parts of South America for making bread. The investigation is described by Dr. Ernst in letters addressed to Kew as follows:—

Caracas, 8th November 1886.

I SEND you to-day a little tin box with three seeds of the *Chiga*-tree, and likewise a sample of the starch prepared from them.

This tree is, as far as I know, not yet known scientifically, although Humboldt mentions it already in his *Personal Narrative* (Vol. VIII., page 312, note). He says, "Une autre espèce de mimosacée que nous "avons rapportée (le *Chiga* des Ottomaques et le *Sepa* des Maypures) "donne des graines dont la farine est mangée à Uriana comme du "manioc. C'est de cette farine que l'on prépare le *pain de chiga* qui "est commun à Cunaviche et sur les bords du Bas-Orénoque. Le "*Chiga* est un espèce d'*Inga*, et je ne connais point d'autre mimosacée "qui suplée aux céréales."

Although Humboldt says that he brought the species from the Orinoco to Europe, there is no mention of it in the botanical part of his great work, so that we must suppose that the specimen either got lost or was quite insufficient for being described.

Nor is there any other mention of this curious plant in any of the botanical publications on the flora of this country, at least as far as I have been able to ascertain.

I obtained in 1872 samples of Chiga starch, and since that time tried in vain to obtain specimens of branches with flowers and fruits for botanical identification. In 1883, there was a fine sample of Chiga starch in our National Exhibition; I have it still in the Museo Nacional, and from it is the small quantity I send you. Of course your are welcome to more.

I applied to the gentleman who had sent this starch for getting a botanical specimen; and after a delay of more than three years, he has finally been able to obtain one fruit and 12 isolated seeds. The fruit I keep in our museum; of the seeds I offer you three; it is very little, but perhaps sufficient for an approximate identification.

The fruit is a true legumen, about 6 inches long, and 2 broad; the base is somewhat contracted, the apex rather blunt. The valves are perfectly smooth, and plain; there is no thickened margin close to the sutures. The valves are thin, of a consistency like parchment, and quite smooth inside. The splitting begins on the distal end, and there is some spiral twisting as far as they separate from each other. The fruit contained four full-grown seeds and an abortive one; the former lay close to each other, somewhat overlapping each other with their flat margins.

I have been informed that the tree grows generally by the banks of rivers, and produces abundant crops. The seeds are taken out of the pods and buried for some time in damp soil; then after a certain degree of fermentation has set in they are taken out, washed, and pounded. The flour or starch is used, just as Humboldt says, even to-day for bread-making, especially for a certain kind of little tarts, which are said to be very good to eat. I had one made here in my house; but I must confess that I found its taste rather indifferent and somewhat mouldy. However, this may have depended on the flour being too old.

It appears to me that the *Chiga* cannot be a species of *Inga*, at least in the extension in which this genus is considered to-day. After a very careful search in the *Genera Plantarum* I cannot find any genus which agrees well with the material before me. The structure of the seed, with the spongy central part of the integuments and the winglike margin all round, is rather exceptional in *Leguminosæ*, and were it not that I have seen the seeds adhering to the ventral suture of a half-opened pod, I should have thought they belonged to a bignoniaceous genus.

The spongy structure of the integuments may have some biological meaning. As the tree is said to grow close to the water of rivers, the seeds will frequently fall into the water, where they will float easily on account of their sponginess, and reach in this way a suitable spot for their germination.

Spruce states, on the label of a specimen of *Campsiandra laurifolia*, Benth., in the Kew Herbarium, that "on the Orinoco this, or a closely "allied species of *Campsiandra* . . . affords a considerable part "of the sustenance of certain tribes of Indians. . . . . On the "Rio Negro, in times of scarcity, the seeds of nearly every large-fruited "tree is used in the same way."

In a letter dated 30th January 1888 Dr. Ernst states :—

You remember, perhaps, that some time ago I consulted you about the botanical name of the tree which yields the *Chiga* starch of the Orinoco, mentioned already by Humboldt, who believed it to be an *Inga*. You were so kind to answer me that from the seeds I sent you the plant might be close to *Macrolobium*, and that Mr. R. Spruce suggested *Campsiandra*. Now I am happy to tell you that Mr. Spruce is quite right. I got lately a single flower, which is in every respect in conformity with the description of the same organ given by Poeppig and Endlicher in their *C. rosea* (Walper's Rep. Bot. V., 568).

Finally, we have a letter from Dr. Ernst, dated 2nd February 1889, in which he states that he had at last obtained "one small branch of "the tree yielding Chiga flour, with leaves and flowers. It now proves "to be *Campsiandra comosa*, Benth., and the description given in "Walper's *Repertorium Botanices Systematicæ*, tom. V., p. 568, agrees "in every particular."